

L. Carl Broadhead

*Environmental Consulting Engineer
"Specializing in Air Quality"*

(801) 943-8414 • Fax (801) 944-1767

July 25, 1994

Russell O. Roberts
Utah Division of Air Quality
P.O. Box 84114-4820
1950 West North Temple
Salt Lake City, Utah 84114-4820

Re: Request for Open Pit Bentonite Mine Air Quality Air Quality Approval
Order

Dear Mr. Roberts:

Western Clay Company is in the business of mining and milling nonmetallic minerals. The degree of crushing or/and milling depends on the customers specifications. The milling facilities are at Aurora, Seveir County. The nonmetallic minerals are mined from various deposits, mostly in Utah. The body of bentonite that Western clay uses is located approximately seven miles off Exit 89 on I-70.

In the past Western Clay Company has been able to meet orders with less than a pit of less than five acres. With increased sales, WCC will have to have a larger pit. In order to open a pit larger than our present pit, a new permit must be obtained from the Utah Division of Oil, Gas and Mining. (DOGM). If the Notice of Intent for the Division of Air Quality is acceptable please coordinate with DOGM as they will not proceed until they have received word from the DAQ of our compliance with your rules

Please find enclosed a Notice of Intent for an approximately 12 acre, open Bentonite pit mine with an output limitation of 70,000 ton of ore per year.

If there are additional questions please call Carl Broadhead at (801) 943-8414.

Sincerely

L. Carl Broadhead

L. Carl Broadhead
Environmental Consultant for Western Clay Company



UTAH STATE UNIVERSITY

LOGAN, UTAH 84322-4830

USU Analytical Laboratories

Soil Testing Lab

Plant Analysis Lab

Feed Analysis Lab

Irrigation Water Analysis Lab

Telephone (801) 797-2217

Fax (801) 797-3376

29 June 1994

Results for:

Jeffery McClellan
Western Clay Co.
PO Box 127
Aurora, UT 84620

Soil samples received 6/14/94.

USU#	ID	SAR
94-S-827	surf outcrop undist burro	9.9
828	surface undisturb bent outcrop	59.4
829	mined bent crude clay pile	48.8
830	waste bent pile composite	51.8

*If you have any questions or require specific
recommendations, please contact the lab*

1. There is no indication that N fertilizer will increase yield or quality of alfalfa. If grain is to be seeded with new alfalfa, do not apply more than 50 lbs N/acre.
2. **Pasture and Meadows** Split N applications help to maintain yield and protein content throughout the season. Half of the year's application can be done in the fall if it is watered in immediately or injected directly into the sod (early spring application is also effective). The second half can be broadcast after the first cutting in the spring just before irrigating. Do not apply more than 75 lbs. of N at one time. See also Note 4 below.
Mixed legume-grass pastures containing more than 1/3 legume may not benefit from added N.
3. A valid N test requires sampling at least 0-1 and 1-2 feet, and quick drying of the sample (see sampling instructions). If your sample did not meet these requirements, the nitrate-N value reported was not used in our recommendations unless it was unusually high. You may multiply ppm N by 4 to estimate pounds of N in 1 acre-foot of soil as tested.
4. Fertilizer N can be lost through leaching under conditions of excess irrigation or rainfall. Its management is therefore of special importance. In cases of high N rates, sandy soils, or long-season crops, split applications will increase plant use of the fertilizer N, avoid late season deficiency, and reduce leaching losses. For annual crops, split applications of N also offer the opportunity to adjust the rate during the season according to the yield prospect.
Fall application of N is feasible on medium to heavy soils in areas of low to moderate rainfall.
5. **Potatoes** For potatoes, apply 1/3 of N preplant, the rest during the growing season. Follow petiole N. Avoid high N late in the season. See also Note 4 above.
6. **Phosphorus (P) and Potassium (K)** Plowdown or band applications are preferred for all new seedlings. For established perennial crops such as alfalfa and pasture, broadcast recommended fertilizer at earliest possible date.
Subsoil P and K levels can affect crop responses to fertilizer P or K.
7. Your soil sample is low or marginal in available potassium (K). the amount of K supplied by the irrigation water can thus be important. Mountain streams near their sources, and some city water supplies and wells are low in K. Several major Utah irrigation waters carry enough K to supply crop needs.
8. **Dryland Production** Response to fertilizer on drylands is highly dependent on available moisture. Fall applications are usually most effective.
Phosphate must be incorporated into the soil by tillage or drilled with the seed.
Nitrogen applied broadcast prior to planting

should be incorporated by tillage as soon as possible.

Spring applications of nitrogen can be made on unfrozen soil in March or early April, when the probability of rain is highest.

In years of exceptionally good soil moisture, apply the highest amount of N within the range given. In average years, amounts toward the middle of the range are preferred. If winter precipitation has been unusually high, additional N should be applied in the spring.

9. **Micronutrients** Utah soils are generally well supplied with micronutrients. "Shotgun" applications of mixtures containing boron, manganese, iron and copper "for insurance" have not been shown to be effective and are not suggested.

Zinc deficiencies have been identified in sensitive crops in some areas. Excessive phosphorus may induce zinc deficiency.

If soil zinc is Very Low, apply 10 lbs. of zinc per acre; if Low, apply 5 lbs per acre, all preplant.

In-season zinc deficiency may be corrected by spraying the crop with zinc sulfate solution. Consult qualified dealers for details of application methods and rates.

Occurrence of **iron** deficiency is primarily related to crop variety (root stock for orchards and vines). **Soil tests for predicting iron availability have not yet proved to be reliable.**

Iron deficiencies occur most often in wet soils high in lime. Excessive P or overwatering may aggravate the problem. Heavy applications of manure can cause iron deficiency in sensitive plants.

Soil application of inorganic iron compounds such as iron sulfate is not effective in Utah soils. Iron chelates vary in effectiveness, Fe EDDHA or Fe 138 being the best tested so far. Plant deficiencies may be corrected by spraying foliage with iron sulfate solution, repeating as necessary if symptoms persist. Consult specialists for details of methods and rates.

- 10a. This sample shows a slight to moderate accumulation of salt, sufficient to affect growth of sensitive crops. If subsoil drainage is adequate, applying an excess of good quality water can reduce salts to an acceptable level. If pH is also HIGH, special treatment may be needed to reduce sodium.
- 10b. This sample shows a high accumulation of salt, toxic to many crops. It is also high in sodium and will require special treatment before fertilizers are applied. Seek qualified assistance.
11. The standard soil sample depth is from surface down to 12 inches (see instructions on back of Sample Description sheet) If your sample depth was much different from this, test results may be misleading.

USU Policy It is the policy of the USU Soil Testing Laboratory to recommend only those nutrients that offer a reasonable possibility of increasing the economic return for your crops, and in those amounts that should be necessary to achieve your yield capability. Ranges of nutrients are given, to permit farm operator judgment.

SOIL TEST REPORT and FERTILIZER RECOMMENDATIONS

SOIL TESTING LABORATORY
Utah State University UMC 4830
Logan, Utah 84322
(801) 797-2217

Name JEFFERY MCCLELLAN
Street PO BOX 127
City, State AURORA, UTAH 84620
Zip

Date 8/29/94

SAMPLE IDENT.	CROP TO BE GROWN	SOIL TEXTURE	LAB NO.
1) _____	_____	LOAM	827
2) _____	_____	CLAY	828
3) _____	_____	CLAY	829
4) _____	_____	CLAY	830

Copy sent to Extension office
in SEVIER County.

SOIL TEST RESULTS	Very Low	Low	Adequate/Normal	High	Very High	RECOMMENDATIONS	Notes
NITRATE-NITROGEN N ppm	1) <u>1.1</u> 2) <u>27</u> 3) <u>14</u> 4) <u>30</u>					<u>90-110</u> <u>90-110</u> N <u>90-110</u> lbs/A <u>90-110</u>	<u>a, b, c</u> <u>a, c</u> <u>a, c</u> <u>a, c</u>
PHOSPHORUS P ppm	1) <u>1.5 **</u> 2) <u>1.1 **</u> 3) <u>.8 **</u> 4) <u>1.3 **</u>					<u>190-210</u> <u>190-210</u> P ₂ O ₅ * <u>190-210</u> lbs/A <u>190-210</u>	<u>d</u> <u>d</u> <u>d</u> <u>d</u>
POTASSIUM K ppm	1) <u>183</u> ***** 2) <u>260</u> ***** 3) <u>333</u> ***** 4) <u>289</u> *****					<u>0</u> <u>0</u> K ₂ O* <u>0</u> lbs/A <u>0</u>	<u></u> <u></u> <u></u> <u></u>
SALINITY EC _e mmhos/cm	1) <u>1.0</u> ***** 2) <u>4.3</u> ***** 3) <u>2.2</u> ***** 4) <u>4.4</u> *****					<u></u> <u></u> <u></u> <u></u>	<u></u> <u>e</u> <u></u> <u>e</u>
pH	1) <u>8.1</u> ***** 2) <u>8.5</u> ***** 3) <u>9.0</u> ***** 4) <u>8.6</u> *****					<u></u> <u></u> <u></u> <u></u>	<u></u> <u>f</u> <u>g</u> <u>g</u>
LIME	1) <u>++</u> ***** 2) <u>++</u> ***** 3) <u>++</u> ***** 4) <u>++</u> *****					<u></u> <u></u> <u></u> <u></u>	<u></u> <u></u> <u></u> <u></u>
) _____						<u></u>	<u></u>
) _____						<u></u>	<u></u>

NOTES:

* P₂O₅ x .45 = P K₂O x .82 = K

- N recommendations tend to be high when based on N tests at non-standard soil depth. See sampling instructions.
- When N in topsoil is very low, some N is needed to supply early crop needs.
- See Note 4 on reverse.
- See Note 6 on reverse.
- See Note 10a on reverse.
- At this sample's salinity level, this pH value indicates a probable sodium problem. Consult local Extension or SCS office or this lab before fertilizers are applied.
- This sample has a serious sodium problem. Consult local Extension or SCS office or this lab before fertilizers are applied.

You may need to modify these recommendations in order to achieve maximum economic return under your specific conditions of weather, finances and management.

PLANT-LIFE PLOT



LOOKING WEST



LOOKING EAST

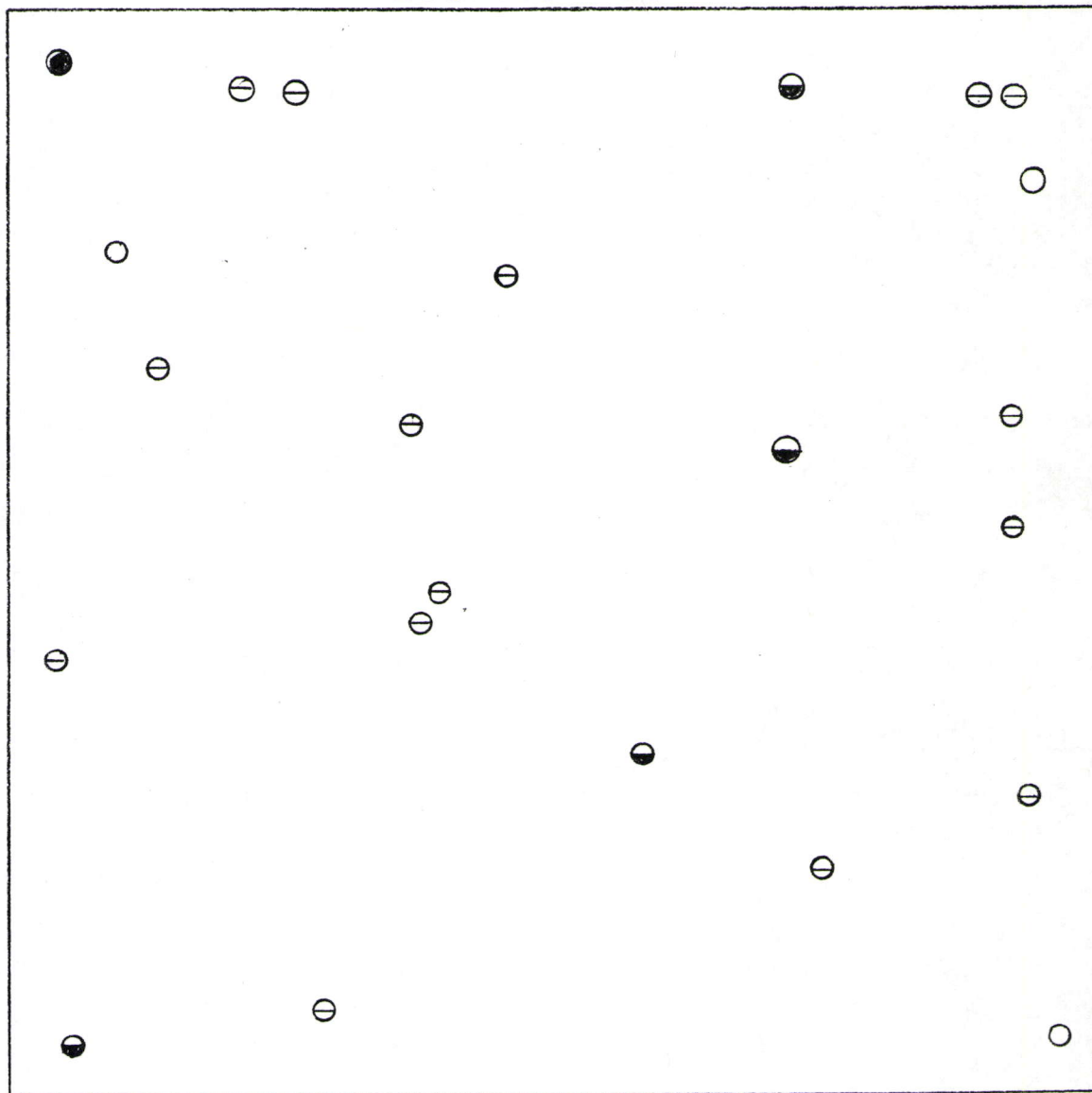
○ ? UNKNOWN

● GARDNER SALT BUSH (CASTLE VALLEY CLOVER)

⊖ ALKALI SACATON

◐ BROOM SNAKEWEED

LOOKING WEST



PLANT PLOT (SEE PHOTO)

1" = 2'

M/015/061

WESTERN CLAY L.C.

SODIUM BENTONITE

WESTERN L.C. 85

100% -100 Mesh
85% -200 Mesh
Bulk Shipments
Bulk Bags
Multi-Wall Paper Bags
50 and 100 lb

WESTERN L.C. ULTRA FINE

Western L.C. 20 Micron
(20u Mean, 44u Top Size)
Western L.C. 10 Micron
(10u Mean, 33u Top Size)
Western L.C. 5 Micron
(5u Mean, 16u Top Size)
Multi-Wall 50 lb Paper Bags

WESTERN L.C. DUSTLESS

40 Mesh by 150 Mesh
Bulk Shipments, Bulk Bags
50 and 100 lb Bags

X-RAY DIFFRACTION ANALYSIS

Na Montmorillonite	88%
Quartz	5%
Feldspar	7%

CHEMICAL ANALYSIS

SiO ₂	58.9%
Al ₂ O ₃	18.9%
Fe ₂ O ₃	3.5%
MgO	2.7%
CaO	.7%
TiO ₂	.2%
Na ₂ O	3.4%
K ₂ O	.7%
Loss on Ignition	5.7%
Moisture	6.1%

APPLICATIONS AND USES

- *Foundry Sand Binding Agent
- *Livestock and Poultry Feed
Cube and Pellet Binder.
- *Beverage Industry
Fining of Wine.
Beer Stabilization.
- *Drilling Industry
Oil Wells, Mineral Exploration
Constructional Drilling,
Water Wells, Hole Plug.
- *Paper Industry
News Paper Filler.
Color Developer for Carbonless
Copy Paper.
Adsorption of Impurities in
White Water System.
- *Chemical Industry
Waste Water Purification.
Cleaning Oil from Laundry
and Oil Field Water.
Adsorbent for Radioactive
Materials.
- *Asphalt Emulsion Seal Coat
Viscosifier.

TYPICAL PROPERTIES

Density (Compact)-	50-70 PCF
Moisture-	6-12%
pH-	8.5-9.0%
Cation Exchange Capacity-	95 meq/100g
Soluble Calcium-	7.5 meq/100g
Plate Absorption-	700-750%
Color-	Off White

**WESTERN
CLAY COMPANY**

INDUSTRIAL/AGRICULTURAL MINERALS

P.O. Box 127, Aurora, Utah 84620
Office: (801) 529-3281 • Plant: (801) 529-3445

SURE-SEAL BENTONITE

(L.C. TYPE)

SURE-SEAL 4-O

100% -4 Mesh
5% -200 Mesh
Bulk Shipments

SURE-SEAL 20-0

1% +20 Mesh
45% -200 Mesh
Bulk Shipments
Bulky Bags
Multi-Wall Paper Bags
50 and 100 lb

SURE-SEAL 80

80% -200 Mesh
Bulk Shipments
Bulky Bags
Multi-Wall Paper Bags
50 and 100 lb

SURE-SEAL SALINE AND CHEMICAL RESISTANT

Includes the above
Products treated to
maintain sealing
properties in high
salinity, acidic
and organic solvent
environments.

TYPICAL PROPERTIES

Density- 72 lb/ft³
Moisture- 6-12%
Wet Sieve- 97% -200 Mesh
Swell- 700%
pH- 8.5-9.0
Cation Exchange
Capacity- 95 meq/100g
Color- Light tan

APPLICATIONS AND USES

SOIL SEALANT FOR-

- *Reservoirs
- *Municipal Landfills
- *Sanitation Lagoons
- *Hazardous Storage Facilities
- *Tailings Ponds
- *Leach Pads
- *Canals
- *Tank Farms

X-RAY DIFFRACTION ANALYSIS

Na Montmorillonite	88%
Quartz	5%
Feldspar	7%

CHEMICAL ANALYSIS

SiO ₂	58.9%
Al ₂ O ₃	18.9%
Fe ₂ O ₃	3.5%
MgO	2.7%
CaO	.66%
TiO ₂	.16%
F	.11%
LiO ₂	.04%
Na ₂ O	3.4%
K ₂ O	.71%
Loss on Ignition	5.7%
Moisture	6.1%
Total	100.7%

Percent Sure-Seal required in soil/bentonite mix designs varies depending on soils size distribution and particle shape.
Permeability testing is required to determine proper mix design.

WESTERN CLAY COMPANY

INDUSTRIAL/AGRICULTURAL MINERALS

P.O. Box 127, Aurora, Utah 84620
Office: (801) 529-3281 • Plant: (801) 529-3445